

CITY OF WILMINGTON, OHIO

Wastewater Treatment Plant

Basic Design Data

TREATMENT REQUIRED

Based upon OEPA Permit No. 1PD00013*ID

Parameter	30-Day Average	7-Day Average
Biochemical Oxygen Demand (BOD)		
(Summer)	15 mg/l	23 mg/l
(Winter)	25 mg/l	40 mg/l
Suspended Solids (SS)		
(Summer)	20 mg/l	30 mg/l
(Winter)	30 mg/l	45 mg/l
Ammonia (NH ₃ -N)		
(Summer)	2.0 mg/l	3.0 mg/l
(Winter)	4.5 mg/l	6.8 mg/l
Design Criteria		
Year		2010
Population		12,444
Wastewater Flow		
Average Design Flow		3.0 mgd
Daily Maximum		4.6 mgd
Peak Design (Secondary Treatment)		6.25 mgd
Peak Flow Rate		8.5 mgd
Raw Wastewater Strengths		
BOD ₅		200 mg/l
SS		200 mg/l
NH ₃ -N		25 mg/l
Bar Screen		
Number and Screen Size (Mechanical)		1 @ 3 ft W x 4.5 ft depth
Bar Openings		5/8 inch
Number and Screen Size (Stand-by)		1 @ 3 ft W x 4.5 ft depth
Bar Openings		1 inch
Screening Quantities		
Average		0.67 cu yd/day
		1,085 lb/day
Peak		3.8 cu yd/day
		6,150 lb/day
Grit Removal		
Number and Size		1 @ 12 ft diam x 4 ft SWD
Type		Gravity
Grit Separator—Number, Type & Size		1—Cyclone-200 gpm
Circular Primary Clarifiers		
Number and Size		2 @ 45 ft diam x 7 ft SWD
	Each	Total
Surface Area	1,590 sq ft	3,180 sq ft
Volume	11,130 cu ft	22,260 cu ft
Capacity	83,475	166,950 gal
Overflow Rate		943 gpd/sq ft
at 3.0 mgd		1,450 gpd/sq ft
at 4.6 mgd		
Detention Time		1.3 hr
at 3.0 mgd		0.9 hr
at 4.6 mgd		
Weir Overflow Rate		11,700 gpd/ft
at 3.0 mgd		18,000 gpd/ft
at 4.6 mgd		
Rectangular Storm Flow Clarifiers		
Number and Size		2 @ 25 ft x 50 ft x 11 ft SWD
	Each	Total
Surface Area	1,250 sq ft	2,500 sq ft
Capacity	103,125 gal	206,250 gal
Total Surface Area,		5,680 sq ft
2 Rectangular Units and 2 Circular		
Overflow Rate		1,170 gpd/sq ft
at 6.65 mgd		1,496 gpd/sq ft
at 8.5 mgd		
Primary Effluent Characteristics		
BOD ₅		130 mg/l
SS		100 mg/l
NH ₃		25 mg/l
Trickling Filter Towers		
Number and Dimensions		2 @ 65 ft diam x 16 ft media depth
	Each	Total
Surface Area	3,320 sq ft	6,640 sq ft
Volume	52,800 cu ft	105,600 cu ft
Hydraulic Loading @ 3.0 mgd		0.32 gpm/sq ft
Media Type		60° cross flow, 42 sq ft/cu ft
Organic Loading		31.0 lb/BOD/day/kcf
Trickling Filter Effluent Characteristics		
At Average Flow = 3.0 mgd	Summer	Winter
BOD ₅ (Total)	40 mg/l	48 mg/l
TSS	77 mg/l	83 mg/l
BOD ₅ (Soluble)	1.4 mg/l	2.5 mg/l
NH ₃ -N	25 mg/l	25 mg/l

Aerated Contact Tanks

Number and Size	2 @ 25 ft x 65 ft x 19 ft SWD
	Each
Volume	30,875 cu ft
	231,500 gal
	Total
	61,750 cu ft
	463,000 cu ft
Detention Time	
3.0 mgd	3.7 hr
4.6 mgd	2.4 hr
6.25 mgd	1.8 hr
Volumetric Loadings—3.0 mgd	
BOD ₅	20 lb/day/kcf
NH ₃ -N	10 lb/day/kcf
Oxygen Required—Peak	
BOD ₅ : 1,362 lb BOD ₅ /day x 1.1 lb O ₂ /lb BOD ₅	1,498 lb/day
NH ₃ -N: 710 lb NH ₃ -N/day x 4.6 lb O ₂ /lb NH ₃ -N	3,265 lb/day
	4,663 lb/day

AERATED CONTACT BLOWERS

Number and Type	3 - Centrifugal
Capacity SCFM	770
Discharge Pressure	9.5 psig
HP	100

Secondary Clarifiers

Number and Size	2 @ 75 ft diam x 15 ft SWD
Center Flocculating Well	25 ft diam x 7 ft SWD
Detention Time,	
at 3.0 mgd	25 minutes
at 6.25 mgd	12 minutes
Clarifier Effective Surface	
Area	Each
	3,906 sq ft
	Total
	7,812 sq ft
Overflow Rate,	
at 3.0 mgd	384 gpd/sq ft
at 6.25 mgd	800 gpd/sq ft
Volume, cu ft	Each
gallons	66,270 cu ft
Weir Length	496,750 gal
Detention Time,	220 ft
at 3.0 mgd	440 ft
at 6.25 mgd	
Weir Overflow Rate,	
at 3.0 mgd	6,820 gpd/ft
at 6.25 mgd	14,200 gpd/ft

Disinfection

Type	Ultraviolet
Channels	
Number and Size	2 @ 16-1/2" W x 121" L x 65" D
Ultraviolet Units	
Number, Total	12
Number of Bulbs per Unit	28
Ultraviolet Light Dosage, at Peak Flow	16,000 UWS/sq cm

Sludge Thickener

Number and Size	1 @ 30 ft diam x 8 ft SWD
Surface Area	706 sq ft
Capacity	42,400 gal
Overflow Rate	410 gpd/sq ft

Aerobic Digestion Tanks

Number and Size	1 @ 30 ft diam x 19 ft SWD	1 @ 40 ft diam x 23 ft SWD	Total
Volume/Capacity			
Cubic Feet	13,430	28,902	42,332
Gallons	100,725	216,769	317,332
Volatiles Solids Loading			89 lb/1,000 cu ft/day
Detention Time, at			21 days
4% Solids			
Mechanical Aeration			Submersible, Self-Aspirating
Number and Sizes			1 @ 50 Hp
			1 @ 75 Hp

Sludge Holding Tank

Number and Sizes	Tank No.	2 at 65 ft x 27 ft x 15 ft SWD
	No. 1 and 2	1 at 40 ft diam x 8.85 ft SWD
	No. 3	1 at 45 ft diam x 12.05 ft SWD
	No. 4	
Volume/Capacity		cu ft
Tanks No. 1 and 2		52,600
Tank No. 3		83,367
Tank No. 4		19,154
Total		143,662
Detention Time,		82,919
at 4% Solids		621,904
Drying Beds		
Number and Size		4 @ 60 ft x 20 ft
Capacity @ 10 inch depth,	Each	7,480 gal
	Total	29,920 gal